

REMARKS

This paper is being provided in response to the Final Office Action mailed April 23, 2004, for the above-referenced application. In this response, Applicants have cancelled claim 2 herein without prejudice or disclaimer of the subject matter thereof and amended claims 1, 8, 12 and 14 to clarify that which Applicants consider to be the invention. Applicants respectfully submit that the amendments to the claims are fully supported by the originally-filed specification.

The objection to claim 14 for informalities is address by amendments contained herein according to the guidelines set forth in the Office Action. Accordingly, Applicants respectfully request that this objection be reconsidered and withdrawn.

The rejection of claims 1, 4, 8 and 12 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,391,865 to Kurata et al. (hereinafter "Kurata") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

Independent claim 1, as amended herein, recites an optical head. A light source emits a light beam to be irradiated to an optical recording medium as an incident light beam. A hologram element receives a reflected light beam generated by reflection of the incident light beam on the medium to generate at least two diffracted light beams for focusing error detection and at least two diffracted light beams for tracking error detection. An optical detector detects the at least two diffracted light beams for focusing error detection and the at least two diffracted

light beams for tracking error detection. The detector includes a first receiving surface for receiving the diffracted beams for focusing error detection and a second detection surface for receiving the diffracted light beams for tracking error detection. Each of the first and second receiving surfaces is divided into receiving regions that receive the focusing error detection beams and the tracking error detection beams, respectively. The hologram element has diffraction gratings divided by at least one division line, said gratings having different grating patterns and at least one of the grating patterns being non-linear and having an offset center with respect to another of said different grating patterns. The at least two diffracted light beams for focusing error detection and the at least two diffracted light beams for tracking error detection are generated by said gratings of said element. Further, the hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of said reflected light beam, wherein the hologram element has a refractive index that varies according to the polarization direction. Claims 4-7 depend directly or indirectly on independent claim 1.

Independent claim 8, as amended herein, recites an optical head. A light source emits a light beam to be irradiated to an optical recording medium as an incident light beam. A hologram element is included that has gratings divided by at least one division line and having different patterns, at least one of the patterns being non-linear and having an offset center with respect to another of the patterns. The hologram element receives a reflected light beam generated by reflection of the incident light beam on the medium to generate at least two diffracted light beams for focusing error detection and at least two diffracted light beams for tracking error detection by using the gratings. An optical detector detects the at least two diffracted light beams for focusing error detection and the at least two diffracted light beams for

tracking error detection. The detector includes a first receiving surface for receiving the diffracted beams for focusing error detection and a second detection surface for receiving the diffracted light beams for tracking error detection. Each of the first and second receiving surfaces is divided into receiving regions that receive the focusing error detection beams and the tracking error detection beams, respectively. Further, the hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of said reflected light beam, wherein the hologram element has a refractive index that varies according to the polarization direction. Claims 9-11 depend directly or indirectly on independent claim 8.

Independent claim 12, as amended herein, recites an optical head. A light source emits a light beam to be irradiated to an optical recording medium as an incident light beam. A hologram element is included that has a first diffraction grating on a surface of the element and a second diffraction grating on an opposite surface thereof, the first and second gratings having different patterns, at least one of the patterns being non-linear and having an offset center with respect to another of the patterns. The hologram element receives a reflected light beam generated by reflection of the incident light beam on the medium to generate at least two diffracted light beams for focusing error detection and at least two diffracted light beams for tracking error detection by using the gratings. An optical detector detects the at least two diffracted light beams for focusing error detection and the at least two diffracted light beams for tracking error detection. The detector includes a first receiving surface for receiving the diffracted beams for focusing error detection and a second detection surface for receiving the diffracted light beams for tracking error detection. Each of the first and second receiving surfaces is divided into receiving regions that receive the focusing error detection beams and the

tracking error detection beams, respectively. Further, the hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of said reflected light beam, wherein the hologram element has a refractive index that varies according to the polarization direction. Claims 13-15 depend directly or indirectly on independent claim 12.

The Kurata reference discloses an optical grating assembly including a holographic grating having two sections 3a and 3b. Light beams are initially diffracted into a zero-order main beam and first-order sub beams which then pass through the holographic grating sections 3a and 3b which diffract these beams again into zero and first order beams. (See col. 11, lines 22-41 and Figs. 17-21 of Kurata).

Applicants' independent claims, as amended herein, all recite at least the features of an optical head with a hologram element including *diffraction gratings divided by at least one division line, said gratings having different patterns, and wherein at least one of said patterns is non-linear and has an offset center with respect to another of said grating patterns, and wherein the hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of said reflected light beam, wherein the hologram element has a refractive index that varies according to the polarization direction.* As shown, for example, in Figures 5A-C and 8A-C, Applicants have found that a hologram element as claimed produces a zero-order diffracted light beam, two + 1st-order diffracted light beams focusing forward with respect to the zero-order diffracted light beam, and two - 1st-order diffracted light beams focusing backward with respect to the zero-order diffracted lights beam. (See, for

example, page 26, line 21 to page 27, line 8 and page 38, lines 2-9 of the present application). Further, Applicants have found it preferable for the hologram element to have a property of selectively exhibiting a diffraction grating function according to a polarization direction of the reflected light beam. The hologram element has a refractive index that varies according to the polarization direction of the light beam received. (See, for example, page 19, lines 16-22 and page 26, lines 3-5 of the present application).

Applicants respectfully submit that Kurata does not teach or fairly suggest at least the above-noted features as claimed by Applicant. Specifically, Kurata does not disclose that the hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of the reflected light beam, as is claimed by Applicants. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

The rejection of claims 1 and 8 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,924,079 to Opheij et al. (hereinafter "Opheij") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claims 1 and 8 are discussed above.

The Opheij reference discloses an apparatus for optically scanning an information plane that includes first and second diffraction elements. The first diffraction element forms a beam from which a focus-error signal can be derived and the second diffraction element forms two

auxiliary beams by means of which a tracking-error signals can be derived. (See Fig. 5 and col. 4, line 51 to col. 5, line 46 of Opheij.)

Applicants submit that Opheij does not teach or fairly suggest at least the features of an optical head with a hologram element including *diffraction gratings divided by at least one division line, said gratings having different patterns, and wherein at least one of said patterns is non-linear and has an offset center with respect to another of said grating patterns, and wherein hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of said reflected light beam, wherein the hologram element has a refractive index that varies according to the polarization direction of said reflected light beam*, as is claimed by Applicants. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

The rejection of claim 2 under 35 U.S.C. 103(a) as being unpatentable over Kurata in view of U.S. Patent No. 6,418,098 to Yamamoto (hereinafter "Yamamoto") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein. Claim 2 has been cancelled herein; however, its subject matter has been incorporated into independent claims 1, 8 and 12.

The Kurata reference is discussed above with respect to the independent claims.

The Yamamoto reference discloses an optical head apparatus for reproducing information from an optical recording medium. The Office Action cites col. 49, lines 62-66 of Yamamoto in

which is stated that the utilization efficiency of the light of the light source can be enhanced when a polarized type is selected as the diffractive optical element.

Applicants respectfully submit that Yamamoto fails to overcome the above-noted deficiencies of the Kurata reference with respect to Applicants' present claimed invention. Specifically, Yamamoto discloses the utilization of a diffractive optical element that is selected for a particular polarized type in order to improve utilization efficiency, but there is arguably no suggestion that the diffractive optical element includes properties that vary according to different polarization directions of received light beams. Neither Kurata nor Yamamoto, taken alone or in combination, arguably disclose a hologram element that selectively exhibits a diffraction grating function according to a polarization direction of a reflected light beam and has a refractive index that varies according to the polarization direction, as is claimed by Applicant. Accordingly, Applicant respectfully request that this rejection be reconsidered and withdrawn.

The rejection of claims 5-7 under 35 U.S.C. 103(a) as being unpatentable over Opheij in view of U.S. Patent No. 5,687,155 to Fukakusa et al. (hereinafter "Fukakusa") is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 1 are discussed above with respect to the Opheij reference. Claims 5-7 depend thereon.

The Fukakusa reference discloses an optical integrating element and integration type optical pickup device. The Office Action cites Fukakusa as disclosing a package having a positioning mechanism and a base the includes holes in the inner and outer walls of the base among other features. (See Figs. 2 and 7 of Fukakusa.)

Applicants respectfully submit that Fukakusa fails to overcome the above-noted deficiencies of the Opheij reference with respect to Applicants' present claimed invention. Specifically, neither Fukakusa nor Opheij, taken alone or in combination, teach or fairly suggest at least the features of an optical head with a hologram element including *diffraction gratings divided by at least one division line, said gratings having different patterns, and wherein at least one of said patterns is non-linear and has an offset center with respect to another of said grating patterns, and wherein hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of said reflected light beam, wherein the hologram element has a refractive index that varies according to the polarization direction of said reflected light beam*, as is claimed by Applicants. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

The rejection of claims 9-11 and 13-15 under 35 U.S.C. 103(a) as being unpatentable over Kurata in view of U.S. Patent No. 5,956,302 to Maeda et al. (hereinafter "Maeda") and further in view of Fukakusa is hereby traversed and reconsideration is respectfully requested in view of the amendments to the claims contained herein.

The features of independent claim 8 and 12 are discussed above. Claims 9-11 and 13-15 depend thereon.

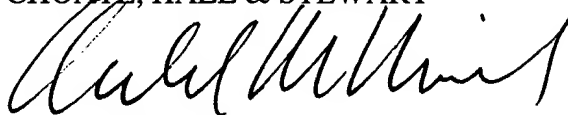
The Kurata and Fukakusa references are discussed above.

The Maeda reference discloses a high density double diffraction grating constructed with two high-density diffraction gratings superposed on each other. The gratings may have different pitch angles. (See Abstract and Figure 5 of Maeda).

Applicants respectfully submit that Maeda fails to overcome the above-noted deficiencies of the Kurata and Fukakusa references with respect to Applicants' present claimed invention. Specifically, neither Maeda, Kurata nor Fukakusa, taken alone or in any combination, teach or fairly suggest at least the features of an optical head with a hologram element including *diffraction gratings divided by at least one division line, said gratings having different patterns, and wherein at least one of said patterns is non-linear and has an offset center with respect to another of said grating patterns, and wherein hologram element has a property of selectively exhibiting a diffraction grating function according to a polarization direction of said reflected light beam, wherein the hologram element has a refractive index that varies according to the polarization direction of said reflected light beam*, as is claimed by Applicants. Accordingly, Applicants respectfully request that this rejection be reconsidered and withdrawn.

Based on the above, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 617-248-4038.

Respectfully submitted,
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